Sampling and Analysis Plan Summary

Cedar Chemical Corporation Facility

Helena - West Helena, Arkansas

Prepared for:

ExxonMobil Corporation and Helena Chemical Company

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1.0 WORKPLAN PURPOSE

This Sampling and Analysis Plan (SAP) Summary has been prepared to support the January 2008 groundwater sampling event at the Cedar Chemical Company Facility ("the Site") located in Helena-West Helena, Arkansas. This event is being conducted to supplement groundwater data needs identified in the Current Conditions Report (CCR) submitted to the Arkansas Department of Environmental Quality (ADEQ) on November 20, 2007 on behalf of ExxonMobil Chemical Corporation and Helena Chemical Company, which comprise the Cedar Chemical Corporation Joint Defense Group ("the Group"). The data from this event will be compared with the groundwater data collected during previous recent events and used to identify locations for new monitoring wells to be installed to support the findings in the CCR.

ADEQ has agreed to allow a SAP Summary in lieu of a formal SAP for this event only. A final formal SAP including a Data Quality Objective Plan will be submitted to ADEQ with the Facility Investigation (FI) Workplan on January 18, 2008. All of the work at the Site is being conducted under the March 22, 2007 Consent Administrative Order (CAO).

2.0 PROJECT OBJECTIVE

This SAP Summary has been prepared to document the technical approach for this groundwater monitoring event. The main objectives of this SAP Summary are to provide information on the activities and methods that will be used in the field during this event.

3.0 SAMPLING AND ANALYSIS SCOPE

A pre-sampling site reconnaissance for this event was performed by Geomatrix and ADEQ on December 12, 2007 to identify the location of each of the monitoring wells. During the site reconnaissance, 28 monitoring wells were identified on-site. Since off-site access agreements were not yet in place at the time of the pre-sampling visit, wells located off-site were not observed; however, previous reports indicate that the off-site monitoring well system is comprised of 12 wells. Of these 12 wells eight wells are agricultural wells (AGI-1 through 7 and BHGI 8) and four are previously installed monitoring wells (OFFMW-1 through OFFMW-4). All of the well locations with the exception of AGI-2, 3, 4, 6, and 7 are depicted in Figure 1. These five wells (AGI 2,3,4,6 and 7) will be positively identified once access agreements are finalized with the landowners where the wells are located. During the pre-sampling site reconnaissance visit, wells were photographed and GPS coordinates were obtained at each location.

Due to the time of year that the groundwater sampling event will be conducted, it is possible that the off-site agricultural wells will not be equipped with pumps. In this case the well will not be sampled.

In general, five hydrogeologic units have been identified during previous investigations at the Site; however, only three are considered groundwater-bearing zones. The three groundwater bearing zones are described below:

1. Perched zone extending from ground surface to approximately 32 feet below ground surface (bgs).
2. An upper alluvial unit that extends from 47 to 116 feet bgs; and
3. A lower alluvial unit that extends from 131 to 152 feet bgs.

Details describing the lithology and hydrogeologic characteristics of each unit can be found in the 2007 CCR.

Table 1 below identifies each monitoring well and correlates the groundwater-bearing zone with each well.

TABLE 1

On-Site Wells

Well ID	GW Zone
1MW-1	Perched Zone
1MW-2	Perched Zone
1MW-3	Perched Zone
1MW-4	Perched Zone
1MW-5	Perched Zone
2MW1	Perched Zone
2MW-2	Perched Zone
EMW-6B	Perched Zone
1MW-6	Upper Alluvial Unit
1MW-7	Upper Alluvial Unit
2MW-3	Upper Alluvial Unit
2MW-4	Upper Alluvial Unit
2MW-5	Upper Alluvial Unit
2MW-6	Upper Alluvial Unit
4MW-1	Upper Alluvial Unit
4MW-2	Upper Alluvial Unit
4MW-3	Upper Alluvial Unit
9MW-1	Upper Alluvial Unit

TABLE 1 (Continued)

On-Site Wells

Well ID	GW Unit
EMW-1	Upper Alluvial Unit
EMW-2	Upper Alluvial Unit
EMW-3	Upper Alluvial Unit
EMW-4	Upper Alluvial Unit
EMW-6	Upper Alluvial Unit
EMW-6A	Unknown
EMW-6C	Unknown
EMW-7	Upper Alluvial Unit
2MW-7	Lower Alluvial Unit
4MW-4	Lower Alluvial Unit
OFFMW-2	Upper Alluvial Unit
OFFMW-4	Upper Alluvial Unit
OFFMW-1	Lower Alluvial Unit
OFFMW-3	Lower Alluvial Unit
AGI-1	Lower Alluvial Unit?
AGI-2	Lower Alluvial Unit?
AGI-3	Lower Alluvial Unit?
AGI-4	Lower Alluvial Unit?
AGI-5	Lower Alluvial Unit?
AGI-6	Lower Alluvial Unit?
AGI-7	Lower Alluvial Unit?
BHAG-1	Lower Alluvial Unit?

MW- Monitoring Well
AGI – Agricultural Well
BAHG – Blackhawk Agricultural Well

3.1 WATER LEVEL MEASUREMENTS

Prior to development or sampling of on-site wells, a water level measurement will be collected from each well and well volumes will be calculated. The measurement will be taken from the reference point marked on the inner casing of the well. The collection of water level and total depth measurements from the monitoring wells will provide the data necessary to determine the current groundwater flow direction and groundwater gradient within the monitoring well system, and to calculate purge volume. Water levels will be measured in wells by lowering a pre-cleaned electronic water level indicator down to the water level. All measurements will be recorded to the nearest hundredth of a foot in the field log book. The depth of each well will be recorded to

the nearest one-tenth of a foot. During this measurement, care will be taken by the field crew to note casing integrity any siltation of the well screen.

The electronic water level indicator will be cleaned using a phosphate-free laboratory-grade soap- distilled water mixture, followed by a distilled water rinse before and after each monitoring well is gauged. Agricultural wells will be gauged if the well configuration allows.

3.2 MONITORING WELL DEVELOPMENT

Monitoring wells determined to be in acceptable condition will be developed using a peristaltic pump. The pump will be decontaminated prior to use. All development water will be directly contained in DOT approved 55-gallon drums and staged onsite in a secure location where it will be classified for proper disposal. Samplers will avoid purging wells to dryness by slowing the purge rate. If the well is dewatered during purging, field personnel will collect samples as soon as the water level has recovered sufficiently to collect the required volumes for all anticipated analyses. If the agricultural wells are configured with turbine pumps and electricity, they will be developed by allowing the turbine pump at each well to operate approximately five to ten minutes.

3.3 WELL INSPECTION

After water level measurements are recorded, each of the wells will be visually inspected by a Geomatrix field representative to determine the integrity of the well. The aboveground inspection includes documentation of the condition of the well pad, well casing, manhole cover, well cap, and security devices (i.e. locks and/or bolts). Inoperable or suspect locks will be replaced. Following this surface inspection, a down-hole camera will be used in monitoring wells where no well log is available. Based on a review of available well logs, no log is available for the following wells: 2MW-1, EMW-1, EMW-2, EMW-3, EMW-4, EMW-6, EMW-6A, EMW-6B, EMW-6C and EMW-7. The purpose of this effort is to record screen lengths and total depths as well as inspect the integrity of the well casing and well screens. All inspection findings will be recorded in the field log book and a photograph will be taken of each well as observed from the surface.

3.4 GROUNDWATER SAMPLING

Upon the completion of the well measurements, well development, well inspection and once the water level in the well has stabilized after development, groundwater samples will be collected from each well using the low-stress (a.k.a. low-flow or micro-purge) methodology described by Yeskis and Zavala (2002) and also consistent with USEPA guidelines. Prior to sample

collection, plastic sheeting will be placed around the bottom of the outer casing of each well to contain spillage that may occur. Groundwater stabilization parameters (i.e. pH, conductivity, temperature, dissolved oxygen, ORP, turbidity and flow rate) will be monitored using a multi-parameter probe with a flow-through cell. All instruments used in the field will be calibrated to the manufacturer's recommendation for that specific equipment prior to field use. Field calibration results will be documented in the field logbook. Groundwater samples will be collected when parameters stabilize. To collect the groundwater sample, the multi-parameter flow-through cell will be disconnected from the sampling train so that samples are collected directly out of the tubing to minimize potential volatilization and cross-contamination. Each pump will be decontaminated before and after being used at each monitoring well. Polyethylene tubing used in conjunction with the submersible pumps will be dedicated to one use at each well. After groundwater samples have been collected the tubing will be disposed of in a proper manner. If a pump cannot be used because the recovery rate is so slow and the volume of the water to be removed is minimal (less than 5 feet of water), then a Teflon^{R} bailer, with a double check valve and bottom-emptying device with a control-flow check valve will be used to obtain the sample. The polypropylene rope used with the bailer will be disposed of following the completion of the sampling at each well.

A previous report indicates that samples were collected from the agricultural wells through a 14-inch layflat hose that delivers water to the crop fields (*Trip Report, Cedar Chemical Company, Booz Allen Hamilton, March 2006*). If the well is available for sampling, Geomatrix will inspect the surface configuration of the well and a sample will be collected based on the well configuration.

All groundwater samples will be collected in laboratory-supplied, pre-cleaned, appropriate containers. Any necessary preservative will be added by the laboratory prior to shipping the containers to the field. Once the sample has been collected, the sample container will be labeled with the monitoring well number, site name and location, date and time of collection, required analyses, and the name of the sampling personnel. The sample will then be placed on ice in a laboratory supplied clean cooler, sealed with custody seals before shipment and delivered to the laboratory via overnight courier. Chain-of-Custody (COC) forms will be completed and submitted to the laboratory with the samples. Sample coolers will contain sufficient ice to maintain the required temperature preservation of samples. The COC form will document the well number, date and collection time, sample preservation and required analysis, and maintain traceability of the samples from the time of collection through laboratory analysis. The custody sheet and analysis request forms will be placed inside a watertight plastic bag taped to the inside

of the cooler lid. Samples will be transported to the ADEQ certified laboratory selected for this event. After sampling has been completed the monitoring well will be secured. To determine groundwater conditions at the site, analytical data collected from this sampling event will be evaluated against a two levels of existing regulatory limits: The national primary drinking water regulations (i.e. MCLs and MCLGs), and the U.S. Environmental Protection Agency (USEPA) Region 6 Human Health tap water screening level.

4.0 SAMPLING METHODS

In general, groundwater samples will be collected and analyzed for the following parameters using approved United States Environmental Protection Agency (USEPA) methods:

Parameter		Analysis Method
Volatile Organic Compounds (VOCs)		SW-846 Method 8260B
Semivolatile Organic Compounds (SVOCs)		SW-846 Method 8270C
Organochlorine Pesticides (OC-Pests)		SW-846 Method 8081A
Chlorinated Herbicides		SW-846 Method 8151A
Metals		SW-846 Method 6010B
	Dissolved Iron (Groundwater Only)*	
	Dissolved Manganese (Groundwater Only)*	
	Mercury	SW-846 Method 7470A
	Hexavalent Chromium*	SW-846 Method 7196A or best available
Nitrate, Nitrite*		Method 353.3 or 300
Sulfate*		Method 9038, 9056, or 300
Alkalinity*		Method 310.1
Ammonia*		Method 350.1 and 350.2
Dissolved Gases*		RSK-175

* The compounds and metals targeted for analysis during this sampling event will remain consistent with the historical target analytes with the exception of the parameters above.

The order of sample collection from a monitoring well will proceed as follows:

- VOCs
- Dissolved Gases
- SVOCs
- OC-Pesticides
- Metals
- Nitrate, Nitrite, Sulfate and Alkalinity

The outlined sampling sequence is developed to maintain the integrity of the samples and minimize the potential loss of volatile constituents.

5.0 EQUIPMENT DECONTAMINATION METHODS

Specific sample collection methods and equipment are selected to minimize the potential for cross-contamination. Any equipment that cannot be effectively decontaminated (e.g. twine, rope, bailers, sample tubing) will be disposed of after sampling. Sampling equipment will be cleaned at the site prior to use, between sampling locations, and prior to storage. Due to the nature of contaminants at the site, decontamination procedures will follow Region 6 EPA standard operating procedures (1999) for sampling equipment decontamination which involves the use of solvents and acids to remove potential contaminants from the sampling equipment. The following decontamination sequence generalizes the procedure:

1. If sampling unit is grossly contaminated, physically remove the media from the sampling device through the use of a brush

2. Wash equipment with a phosphate-free laboratory-grade detergent / distilled water solution

3. Rinse with tap water

4. Rinse with distilled water

5. Rinse unit with 10% nitric acid

6. Rinse with distilled water

7. Rinse with solvent (either pesticide-grade methanol or hexane)

8. Let equipment air dry

9. Rinse again with distilled water.

The decontamination (i.e. date and time) of the field equipment will be documented in the field notes. The samples collected for laboratory analysis will be collected directly from the tubing coming out of the well. Rinsate or equipment blanks will be collected on a periodic basis as specified in section 9.0 of this summary. These results will be used as a measure of

decontamination effectiveness against cross-contamination. Project management will review the analytical results of these blanks to determine proper equipment decontamination is conducted in the field. If rinsate results indicate that cross-contamination is an issue project management will ensure techniques are modified to prevent cross-contamination.

6.0 FIELD DOCUMENTATION

Field documentation will be maintained during the execution of these tasks and will include one or a combination of field notes in a field logbook or daily logs, field sampling logs, instrument calibration logs, and data forms. The purpose of this documentation is to provide sufficient information to allow review of field conditions, performance and sample collection, evaluate potential impacts to sample and data integrity, and note any deviations from standard operating procedures outlined in this SAP and further, describe the reason behind the deviation. When necessary, or requested by the task manager, photographs will be taken to provide a visual representation of field conditions and operations. These photographs will be electronically logged and stored at the Austin Geomatrix office.

During the December 2007 Site reconnaissance, a GPS unit was be used to measure the coordinates of each monitoring well relative to a real-world coordinate system. During the FI, a licensed surveyor in the State of Arkansas will be retained to re-survey the top of casing of each well in the monitoring network in order to obtain current coordinates that will be used to develop accurate water level measurements relative to mean sea level.

7.0 INVESTIGATION-DERIVED WASTE

Any investigation-derived waste (IDW) generated during the sampling event will be handled in a manner consistent with USEPA guidance for managing IDW associated with site sample collection, as well as applicable federal and state regulations. IDW includes disposable equipment, Personal Protection Equipment (PPE), purge and development waters, and decontamination fluids. All IDW will be containerized in Department of Transportation (DOT) approved 55-gallon drums, properly labeled and securely stored at the Site pending analytical results for proper waste characterization.

8.0 DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA

The data quality objectives outlined in this section are provided to identify the appropriate type of data required to support project decisions. These objectives are based on the *Guidance for the Data Quality Objective (DQO) Process*, EPA 600/R-96/055 (2000) and outline acceptance and

performance criteria which establish the quality and quantity of data necessary to meet the project DQOs. Acceptance and performance criteria may be specified as precision, accuracy, representativeness, completeness and comparability (PARCC) parameters. These parameters will be more fully defined in the FI Workplan to be submitted to ADEQ at a later date.

9.0 QUALITY CONTROL OBJECTIVES

Quality control (QC) data are a necessary component of the SAP. This data is critical to determining precision and accuracy as well as demonstrating the absence of interferences and/or contamination of sample collection, sample equipment, sample containers, and reagents. Field QC samples will include trip blanks, duplicates, and equipment rinsate blanks. Field QC samples will be preserved, documented in field notes and chain-of-custody forms, shipped, analyzed similarly to the sample they represent (i.e. field samples). Laboratory-based QC will include standards, replicates, spikes, and blanks. Quality Assurance (i.e. Laboratory QA) additionally includes method performance data including instrument set-up, calibrations, and calibration verifications.

The collection of field quality control samples will be documented in the field notes in conjunction with normal sample collection. The following bullets summarize the frequency of collection:

- One field duplicate will be collected per 20 project samples for each analysis in the aqueous matrix;
- One field equipment rinsate blank per equipment set and per 20 project samples will be collected. Equipment that is dedicated or disposable do not require rinsate blanks; and
- One trip blank per cooler in which volatile samples are being shipped. These trip blanks will be analyzed for all volatile methods designated in the methods.

Geomatrix will implement general procedures for data validation consistent with USEPA National Functional Guidelines (NFG) for organic and inorganic data review.

10.0 HEALTH AND SAFETY

A site Health and Safety Plan (HASP) will be developed for this event and used by field personnel. The full HASP will be provided in the FI Work Plan to be submitted to ADEQ at a later date.

11.0 REFERENCES

Yeskis, Douglas, and Zavala, Bernard, May 2002, Ground Water Forum Issue Paper: Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers, EPA 542-S-02-001.

Geomatrix Consultants, Inc. November 20, 2007, Current Conditions Report, Cedar Chemical Corporation Facility, Helena-West Helena, Arkansas

U.S. Environmental Protection Agency, August 2000, *Guidance for the Data Quality Objective (DQO) Process*, EPA QA/G-4, Office of Environmental Information, EPA/600/R-96/055

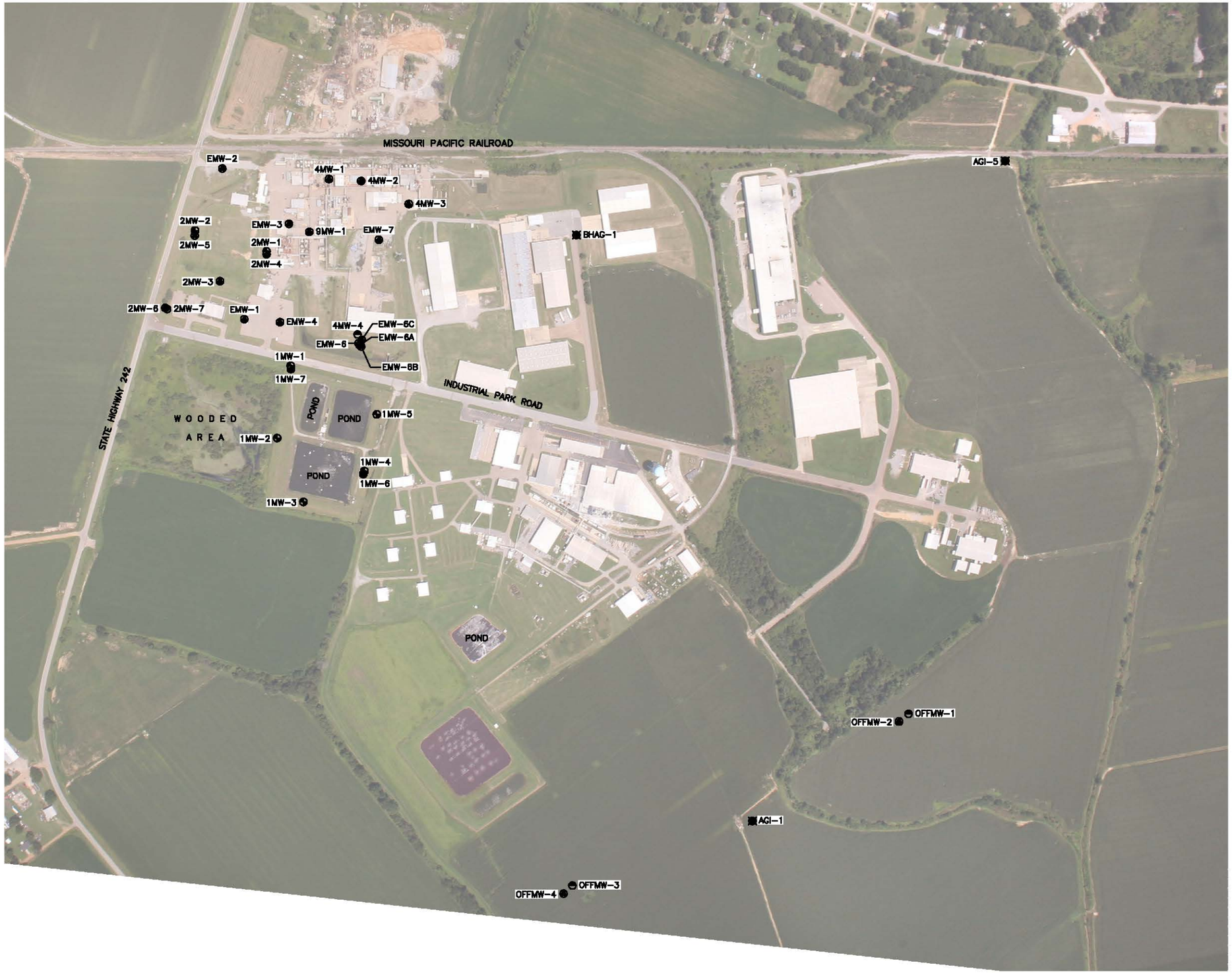
U.S. Environmental Protection Agency, October 1999, Contract Laboratory Program National Functional Guidelines for Organic Data Review. Office of Emergency and Remedial Response. EPA-540/R-99-008 (PB99-963506)

U.S. Environmental Protection Agency, July 2002, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. Office of Emergency and Remedial Response. EPA-540/R-1-008 (OSWER 9240.1-35).

Booz Allen Hamilton, March 31, 2006, EPA Contract 68-W-02-018, RCRA Corrective Action Support for Region 6 States, Trip Report for the Cedar Chemical Corporation Sampling Event in West Helena, Arkansas.

Figure 1

Well Location Map



EXPLANATION

- DEEP MONITORING WELL (LOWER ALLUVIUM)
- SHALLOW MONITORING WELL (UPPER ALLUVIUM)
- PERCHED ZONE MONITORING WELL
- AGRICULTURAL IRRIGATION WELL

WELLS NOT SHOWN DUE TO UNKNOWN LOCATIONS:

AGI-2
AGI-3
AGI-4
AGI-6
AGI-7

APPROXIMATE LOCATION OF WELL COVERED BY ASPHALT:

4MW-2

0 500
APPROXIMATE SCALE IN FEET

BASE MAP MODIFIED FROM:
EnSafe, 1996-Phase III FI, 2001 Groundwater Monitoring Report,
& December 2007 Site Reconnaissance
Drawings C2162GWS and C2162VC7

WELL LOCATION MAP

Cedar Chemical
Helena-West Helena, Arkansas

By: HCS	Date: 12-17-07	Project No. 13636
Geomatrix		Figure 1

12/17/07 ALLUVIAL-01.Dwg